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Using Spread and Net Trading Range to Measure Risk in Suitability Cases

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USING SPREAD AND NET TRADING RANGE TO MEASURE RISK IN SUITABILITY CASES

By Richard A. Booth

ABSTRACT

Suitability is one of the most common issues that arises in securities arbitrations. Yet it is also one of the most difficult issues to resolve. Up to now there has been no easy and reliable way to compare the risk of one stock or portfolio with another stock or portfolio measured as of the time the investment decision in question was made. As I argued in an earlier article, spread is potentially a promising way to measure risk in real time as perceived collectively by competing market makers. But with the advent of decimal quotes and other recent changes in the way stocks are traded, spreads have become more difficult to measure accurately because quote size is often quite limited. As I show here, net trading range (NTR) offers an elegant solution to this problem. NTR measures the range of quotes that the market actually reaches during the day, but it nets out the change in price from open to close, and thus gives an accurate view of the true spread over the course of trading day. Thus, incidentally, NTR addresses a fundamental problem with beta (the prevailing measure of risk). Although beta purports to measure the tendency of a stock to move with the market, it does not adjust for firm-specific (alpha) changes in price. NTR has the added advantage that it is based on uniformly available data for all publicly traded stocks. In short, NTR when averaged over a period of trading days and expressed as a percentage of a stock's closing price is an elegant and fine-grained measure of risk for a stock or portfolio that can be computed with readily available data and used to compare risk from stock to stock and portfolio to portfolio.

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INTRODUCTION

One of the most common claims in disputes between stockbrokers and their customers is the claim that the broker recommended securities that were unsuitable for the customer. Ultimately, suitability is about risk. In other words, the claim by a customer that a broker recommended unsuitable securities (or strategies) boils down to a claim that the broker somehow caused the customer to assume too much risk.[1] But risk is difficult to measure. Even the financially literate often resort to vague impressionistic categories for stocks, such as *growth* or *income* or *value*. Thus, litigating or arbitrating a suitability case often boils down to a naked battle of expert opinion about the quality of the stocks in the investor's portfolio.[2]

I. CONVENTIONAL MEASURES OF RISK

There are several ways to quantify risk with some precision and thus to settle such disputes.

Standard Deviation

The most basic approach to measuring risk is to calculate the standard deviation of earnings (or cash flow or market return). The problem is that the significance of standard deviation is not readily apparent. Moreover, and more important, it cannot be compared from one company to the next without further manipulation. Finally, and most important, standard deviation is inherently backward looking. It may give some sense of volatility in the past, but that is not necessarily an indication of things to come.

Beta Coefficient

Perhaps the most common measure of risk for stocks is the *beta coefficient* or simply *beta*. In essence, beta is a measurement of the tendency of a stock to move with the market. That is the same thing as risk (although the relationship is not necessarily obvious).[3] There are also significant problems using beta. As with standard deviation, it is inherently backward looking. Moreover, it can be difficult to find betas for many

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[1] *See* Richard A. Booth, *The Suitability Rule, Investor Diversification, and Using Spread to Measure Risk,* 54 Bus. Law. 1599 (1999). http://papers.ssrn.com/sol3/papers.cfm?abstract_id=200388 The 1999 article was written before the advent of decimal quotes and contains extensive discussion of issues (such as execution between the quotes) that have been rendered largely irrelevant in today's market.

[2] *See generally* Shad v. Dean Witter Reynolds, Inc., 799 F.2d 525 (9th Cir. 1986).

[3] See Richard A. Booth, *The Logic of Beta, http://bizlaw.blogs.com/sarp/*

stocks. And it is virtually impossible to find historical betas -- the beta at the time of an investment decision. Moreover, there are wide variations in the way that beta is calculated from one service to another, and there is no real agreement on the way it should be calculated. Finally, there are numerous technical problems with beta.[4]

II. USING SPREAD TO MEASURE RISK

There is a much simpler and more intuitive way to measure risk. The spread between the bid and the ask is a direct reflection of the risk perceived by market makers (dealers). The greater the spread, the greater the risk. The reason is fairly simple. Dealers make money on the spread -- by buying low and selling high. They would prefer to keep spreads as wide as possible. (Hence the NASDAQ scandal of a few years back.) But if one dealer quotes a spread that is too wide, another will quote a narrower spread and attract more business. If the bid is slightly higher or the ask is slightly lower, that is where investors will go to trade. There is also a natural limit on how narrow a spread can go. It must remain sufficiently wide for dealers to respond when conditions and prices change. Otherwise, a dealer may find that he has bought stock at a stale bid that is now higher than the fresh ask (or vice versa). The trick is to keep spreads as narrow as possible while keeping in mind that prices may change. In short, because the essence of risk is volatility, riskier stocks require bigger spreads. Moreover, most stocks have multiple dealers. And it is easy for a dealer to begin quoting a new stock. Thus, the market is highly competitive. So whatever the process, the result is the market's best guess as to the risk inherent in trading a given stock.[5]

Quantifying Spread

With the advent of decimal quotes, spread can be quantified easily and compared among stocks and portfolios. For example, if Acme Fireworks last traded at 20.00 and has a bid of 19.95 and an ask of 20.05, it has a spread of ten cents per share. If an investor has a portfolio of stocks, it is a relatively simple matter to calculate the total spread of each stock and add them up. One can thus compare the risk of one portfolio to another by calculating the spread in each as a percentage of portfolio value. For example, a portfolio consisting solely of 1000 shares of Acme Fireworks stock would have a total spread of .10 × 1000 or $100. The portfolio is worth $20,000, so the spread is 0.05 percent of the value of the portfolio. On the other hand, if Binford Tools last traded at 20 and has a bid of 19.90 and an ask of 20.10, a portfolio of 1000 Binford shares would have a total spread of $200 or 0.10 percent of the value of the portfolio. The Binford portfolio is twice as risky as the Acme portfolio if risk is measured in terms of spread.

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[4] *See* Richard A. Booth, *The Trouble with Beta*, http://bizlaw.blogs.com/sarp/ Yet another way to measure risk is by means of the slope (delta) of option prices for the stock in question. *See, e.g.,* Shad v. Dean Witter Reynolds, Inc., 799 F.2d 525 (9th Cir. 1986).

[5] *See generally* GAO, Securities Markets: Decimal Pricing Has Contributed to Lower Trading Costs and More Challenging Trading Environment, May 2005.

Using spread to measure risk is not a theoretical construct that requires empirical testing. Rather, spread is a direct expression of risk at least over the short term (which is the term that matters in most disputes between brokers and customers). Moreover, it is quite appropriate to use spread to measure risk in a suitability dispute because spread is in fact the measure of the risk that an investor faces in buying or selling a particular stock. It is a direct measure of the cost of getting out of an investment and by extension the likely holding period for the stock.[6]

Problems Using Spread

There are significant problems with the use of spread in the context of a real world dispute.

First, the quoted spread at any particular moment may be good only for a limited number of shares. If the quote is good for 1000 shares, an investor who wants to sell 5000 shares may find that the bid decreases quickly after 1000 shares. Information about quotes away from the market is available, but it is incomplete and difficult to evaluate.[7]

Second, it can be difficult to find the spread for many stocks without access to proprietary information. To be sure, there are numerous online services that report quotes. But specialist quotes for exchange listed stocks are often unavailable except to members of the exchange.[8]

Third, *historical* information about quotes is difficult (and expensive) to assemble. But that is the information one needs to analyze an investment decision as of the time it was made.

III. NET TRADING RANGE (NTR)

As it turns out, there is an easy fix for all of these problems. The solution is to use the difference between the high and low prices for reported trades minus the change in price for the day -- the Net Trading Range (NTR). NTR divided by the closing price for the stock yields the net trading range / price (NTR/P) ratio, which is essentially the same thing as the spread / price ratio. In other words, NTR/P is a percentage of the closing

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[6] It is also worth noting that professional traders often use spread as a surrogate for risk and an indication of efficient pricing.

[7] Many such quotes are limit orders designed to stop losses or take profits in the event of significant swings in the market and thus should not be viewed as true quotes. There is, however, way to distinguish such orders from dealer quotes without proprietary information.

[8] Quotes available online are usually the national best bid and offer (NOBO) rather than necessarily the quote from any one market maker. This is not a particular problem. Indeed, NOBO is an even better measure of risk than the quote of a single market maker.

price and gives a measure of the tendency of the stock price to fluctuate intraday that can be compared company to company.

NTR deals with the problem of quote size by including all trades during a given day. In other words, NTR measures spread by the difference between the bid and ask that the market *reaches.* It is not limited to the *quoted* spread, which may be artificially narrow. Thus, NTR will almost always be wider than the quoted spread unless the quoted spread is sufficient to handle all of the trades during the day.

Netting Out Price Changes

It is important to subtract the change in price, because the spread remains more or less constant around the last reported price. And it is the spread that is the measure of risk. To be sure, the spread may change during the day in response to changes in price that differ significantly from changes in the market as a whole. But a change in spread is distinct from a change in price. So spread effectively builds in a discrete measurement of forward risk without corruption from trailing changes in price.

Using Intraday Numbers

It is also important to calculate the change in price by comparing the open and the close (rather than the close from one day and the close from the next day). A stock's price can change overnight and in most cases does so. It is the exception -- not the rule -- for a stock to open at the same price at which it closed on the previous day. To get an accurate picture of spread -- no matter how one measures it -- one must look at the market when it is open for business.

Averaging Over Time

Needless to say, trading conditions vary from day to day. Thus, one cannot reliably measure risk on the basis of NTR for a single day. A look at a simple open-high-low-close (OHLC) chart for a stock over the period of a month reveals at a glance that NTR can vary from day to day.[9] It is also apparent from such charts, however, that the units used for a particular stock tend to remain stable over periods ranging from two weeks to three months. Thus, it is important to use the average NTR over a reasonable period of trading days.[10]

[9] A good source of such material is Big Charts by Market Watch, available at http://bigcharts.marketwatch.com/

[10] Ten days appears to suffice. The average changes little for most stocks when calculated over 20 days. And other things being equal, a shorter time period is preferable because it gives a better sense of risk as perceived by the market at the time of the investment decision.

Calculating the Ratio

The final step in the process is to divide NTR by the (closing) price of the stock. Although it may go without saying, net trading range (like spread) is relative. A $20 stock with a net trading range of 10 cents is one thing. A $100 stock with a net trading range of 10 cents is another. In the former case, NTR is 0.5 percent of the dollar value of the stock. In the latter case, NTR is 0.1 percent of the value of the stock. Thus, in order to make a fair comparison between stocks, the NTR must be divided by the price of the stock to calculate the ratio of NTR to price (NTR/P). Moreover, calculating NTR/P on the basis of trading for a single day and using the closing price for that day results in a fine-grained measurement that may then be averaged over several days.

Table I illustrates the use of NTR to analyze a hypothetical portfolio of eight stocks. The chart is based on NTR as calculated daily for the ten trading days ending January 27, 2006. For each day, NTR is calculated as a percent of the closing price for each stock. The ten daily percentages are then averaged for each stock. Multiplying that percentage by the closing price for each stock (as of January 27, 2006) provides a measure in dollars of the total spread (NTR) attributable to each stock in the portfolio. As the chart shows, the total spread for the eight stocks in the portfolio is $396.32 which represents 1.33 percent of portfolio value.

It is worth noting that a comparison of NTR between major indices shows the relationship one would expect. The usual practice is to assume that the S&P500 is representative of the market as a whole and thus to assume that it is the portfolio deemed to have a beta coefficient of 1.00. For purposes of comparison, Table I shows NTR for both the S&P500 (SPX) (0.42 percent) and the AMEX Major Market Index (XMI) (0.37 percent) for the same ten-day period. The beta for the XMI index is 0.813 (the weighted average of betas for the 20 component stocks).[11]

To translate: beta for the XMI is about 81% of that of the SPX, whereas NTR for the XMI is about 88% of that for the SPX. Thus, NTR confirms (as expected) that the XMI is somewhat safer than the market as a whole but it also indicates that the XMI index is somewhat riskier than revealed by beta. In other words, NTR gives a result that is similar to beta but one that is based on a much simpler calculation using much more recent data.[12]

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[11] The betas for the individual stocks were obtained from MSN Money, available at http://moneycentral.msn.com/detail/stock_quote? and are shown in Table II.

[12] It is important to note that NTR for these indices is not directly comparable to NTR when calculated stock by stock for a portfolio. Table II sets forth NTR for each of the 20 stocks in the XMI for the same period of time. As the table shows, the weighted average NTR for the stocks in the XMI is 0.896 percent of portfolio value. Thus, it is important when using NTR to compare portfolio to portfolio and not between portfolios and indices. On the other hand, the comparison of NTR for the XMI index versus the XMI portfolio dramatically illustrates how diversification reduces risk as measured by NTR. Although XMI consists of just 20 stocks, NTR for the index is about 40 percent of NTR for the individual stocks on the average. In other words, it is about 2.5 times riskier to hold an individual XMI stock than to hold a portfolio that tracks the index. It should also be noted that NTR as here calculated for these stock market indices may be somewhat misstated in comparison to the underlying portfolio in that the data uses previous-day

IV. ADVANTAGES OF NET TRADING RANGE

As with spread, the primary advantage of using NTR to measure risk is that it is a direct and market-based expression of the risk that an investor faces in buying or selling a particular stock. It is not a theoretical construct that requires empirical testing. Rather, it is the measure of the cost of getting out of an investment and by extension the likely holding period for the stock.[13]

Another obvious advantage of NTR is that the data is readily available. Again, that is not true for spread. This is not to say that NTR is preferable simply because it is easier to calculate. NTR is in fact a better measure of spread than spread itself, because the quoted spread is usually good only for a small number of shares (often 1000).

With averaging over ten or twenty days, NTR is a much more accurate picture of risk at a particular point in time than is beta, which typically uses five years worth of monthly closing prices. In other words, beta is by definition quite stale even when it is freshly calculated. [14] One of the fundamental problems with beta as a measure of risk is that it is calculated without netting out changes in price that are attributable to company-specific factors. Although beta purports to be a measure of the tendency of a stock to move with the market as a whole. But beta is typically calculated on the basis of monthly closing prices without regard to whether the change in price is attributable in part to new information about the company. Of course, such changes may wash out over time, given that beta is typically calculated using 60 months of closing prices. But the long averaging period may itself be a problem. The risk inherent in a given stock can change dramatically in the space of five years.[15]

V. POSSIBLE OBJECTIONS

One potential problem with NTR is that the high and low for the day may represent a single very small trade at the high or low end of the distribution (or both). There are several reasons not to worry about this worry. First, as long as one uses NTR consistently, it is a fair comparison between companies. Outlying trades count equally

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close rather than same-day open. The difference is likely to wash out between indices and largely in comparison to portfolios.

[13] *See generally* GAO, Securities Markets: Decimal Pricing Has Contributed to Lower Trading Costs and More Challenging Trading Environment, May 2005.

[14] Although beta could be calculated using daily figures, the universal practice appears to be to use monthly closing figures.

[15] There is another more fundamental problem with this simplistic approach to calculating beta. Suppose that a stock is up one percent on a day when the market is up five percent. It is possible that the stock has a beta of .20 but it is also possible that the stock has a beta of 1.0 and is in effect down four percent compared to the market. There is no way to know. Problems of this sort may account for the fact that the beta reported for some companies is suspiciously low (and in some cases even negative).

for all stocks -- apples to apples.[16] Second, counting outlying trades is a realistic measurement of the risk faced by a small investor who is likely to be the victim of such trades. Larger investors are more likely to negotiate their trades or to use limit orders. Finally, and most important, competition among market makers will take care of the problem in the same way that it does so for quoted spreads. If there are opportunities to trade at the fringes, dealers will compete for the business by bidding higher or asking lower thus keeping the range as narrow as it can be.[17]

CONCLUSION

Suitability is one of the most common issues that arises in securities arbitrations. Yet it is also one of the most difficult issues to resolve. Up to now there has been no easy and reliable way to compare the risk of one stock or portfolio with another stock or portfolio measured as of the time the investment decision in question was made. As I argued in an earlier article, spread is potentially a promising way to measure risk in real time as perceived collectively by competing market makers. But with the advent of decimal quotes and other recent changes in the way stocks are traded, spreads have become more difficult to measure accurately because quote size is often quite limited. As I show here, net trading range (NTR) offers an elegant solution to this problem. NTR measures the range of quotes that the market actually reaches during the day, but it nets out the change in price from open to close, and thus gives an accurate view of the true spread over the course of trading day. Thus, incidentally, NTR addresses a fundamental problem with beta (the prevailing measure of risk). Although beta purports to measure the tendency of a stock to move with the market, it does not adjust for firm-specific (alpha) changes in price. NTR has the added advantage that it is based on uniformly available data for all publicly traded stocks. In short, NTR when averaged over a period of trading days and expressed as a percentage of a stock's closing price is an elegant and fine-grained measure of risk for a stock or portfolio that can be computed with readily available data and used to compare risk from stock to stock and portfolio to portfolio.

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[16] It may be possible to eliminate this problem by using the standard deviation for trade prices during the day, but it would be difficult to do so while at the same time netting out price changes. Thus, NTR is preferable. Moreover, a stock that would have a small standard deviation would presumably also have highs and lows closer to the median.

[17] It is also worth noting that in the absence of the newly adopted Regulation NMS, it is safe to include all trades in calculating NTR. Prior to the adoption of Regulation NMS it was possible for large trades to be executed at prices away from the market, which might have had the effect of making NTR appear wider. In the absence of Regulation NMS it might arguably be necessary to eliminate block trades if they constitute the high or low for the day, although averaging over 20 twenty trading days would likely eliminate most of the effects of including block trades. In any event, with Regulation NMS in place, it is safe to calculate NTR on the basis of reported open-high-low-close without adjustment.

TABLE I

COMPANY	TICKER	SHARES	CLOSING PRICE (01/27/06)	AGGREGATE VALUE	DAILY NTR AS % OF LAST CLOSE (10 day average)	TOTAL SPREAD (dollars)	SPREAD AS % OF PORTFOLIO VALUE
GENERAL ELECTRIC	GE	100	32.95	3295	0.0056	18.50	
MASCO CORPORATION	MAS	100	29.62	2962	0.0083	24.69	
EOG RESOURCES	EOG	100	80.39	8039	0.0172	138.20	
INT'L RECTIFIER	IRF	100	36.08	3608	0.0183	66.20	
THOR INDUSTRIES	THO	100	42.61	4261	0.0129	54.78	
GRANITE CONSTRUCTION	GVA	100	40.56	4056	0.0164	66.66	
STEELCASE	SCS	100	16.93	1693	0.0060	10.12	
STERLING BANCORP	STL	100	19.92	1992	0.0086	17.18	
TOTALS				29906		396.32	0.0133
S&P 500	SPX		1283.72		0.0042	5.35	0.0042
AMEX MMI	XMI		1081.37		0.0037	4.01	0.0037

TABLE II

INDEX / COMPANY	TICKER	AVG % NTR	INDEX WT (021006)	WEIGHTED AVG % NTR	BETA (MSN 022006)	WEIGHTED BETA
AMEX MAJOR MARKET	XMI	0.00371				
S&P 500	SPX	0.00417			1.00	
IBM	IBM	0.00763	0.0885	0.00067	1.56	0.138
3M	MMM	0.01018	0.0790	0.00080	0.67	0.053
ALTRIA	MO	0.00592	0.0782	0.00046	0.51	0.040
PROCTER & GAMBLE	PG	0.00558	0.0650	0.00036	0.19	0.012
EXXON MOBIL	XOM	0.00875	0.0647	0.00057	0.63	0.041
JOHNSON & JOHNSON	JNJ	0.01200	0.0635	0.00076	0.28	0.018
CHEVRON	CVX	0.00922	0.0616	0.00057	0.65	0.040
AMERICAN EXPRESS	AXP	0.00647	0.0577	0.00037	1.28	0.074
WALMART	WMT	0.00986	0.0498	0.00049	0.63	0.031
DOW CHEMICAL	DOW	0.01170	0.0457	0.00053	1.00	0.046
COCA COLA	KO	0.00865	0.0448	0.00039	0.49	0.022
DUPONT	DD	0.00999	0.0443	0.00044	0.95	0.042
MACDONALDS	MCD	0.01230	0.0395	0.00049	1.11	0.044
MERCK	MRK	0.00901	0.0373	0.00034	0.60	0.022
GENERAL ELECTRIC	GE	0.00595	0.0362	0.00022	0.83	0.030
INTERNATIONAL PAPER	IP	0.00754	0.0355	0.00027	0.89	0.032
MICROSOFT	MSFT	0.00782	0.0290	0.00023	1.16	0.034
DISNEY	DIS	0.00820	0.0290	0.00024	1.17	0.034
EASTMAN KODAK	EK	0.01176	0.0267	0.00031	1.20	0.032
GENERAL MOTORS	GM	0.01890	0.0238	0.00045	1.22	0.029
AVERAGES / TOTALS		0.00937	0.9998	0.00896	0.851	0.813